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☐	L36	L34 and disk$1	5
☐	L35	L34 and raid	0
☐	L34	L32 and (logical near5 volume)	9
☐	L33	L32 and epoch	0
☐	L32	(6119131 or 6421684 or 6496839 or 6654881 or 6665786).pn.	10
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☐	L29	L28 and server$1 and configuration	18
☐	L28	(logical near5 volume) and (compar$3 or match$3) and extent and (copy$3 or transfer$3) and memory and raid and cache and status and @py<=2000	22
☐	L27	(raid near5 volume) and (raid near5 epoch)	0
☐	L26	(epoch near5 id$) and @py<=2000	4
☐	L25	(epoch near5 id$) and (raid near5 volume) and cluster$3 and @py<=2000	0
☐	L24	L23 and (compar$3 near5 volume)	0
☐	L23	L22 and (multiple near5 disk$1)	5
☐	L22	(raid and extent and size and logical and volume and configuration and disk$1 and cluster$3) and @py<2000	13
☐	L21	L20 and timestamp$3	5
☐	L20	(disk$1 same (logical near5 volume)) and configuration and status and compar$3 and (index$3 or custer$3) and extent and size and @py<=2000	22
☐	L19	L18 and logical	3
☐	L18	L17 and cluster	3
☐	L17	(raid and epoch) and @py<=2000	13
☐	L16	(disk near5 epoch) and @py<=2000	2
☐	L15	L14 and epoch	0
☐	L14	L13 and (logical near5 volume)	14
☐	L13	L10 and cluster$1	63
☐	L12	L10 and (epoch and configuration and timestamp$3)	3

☐	L11	L10 and (epoch near5 identifier$1)	0
☐	L10	(disk$1 and extent and volume and mirror$3 and block$1 and logical and remote and file$1) and @py<=2000	188
☐	L9	(logical and file$1 and disk and raid and logical and identifier$1 and extent and epoch) and @py<=2000	5
☐	L8	(epoch and disk and volume and raid and logical) and @py<=2000	6
☐	L7	L6 and epoch	1
☐	L6	L5 and (disk near5 block$1)	6
☐	L5	L4 and (disk near5 extent$1)	9
☐	L4	(raid and disk$1 and logical and volume and extent$1 and configuration and mapp$3) and @py<=2000	52
☐	L3	L2 and epoch	3
☐	L2	(raid and mirror$3 and volume and logical and block$1 and mapp$3 and extent$1) and @py<=2000	37
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☐	L11	L10 and read$3	12
☐	L10	L9 and epoch	13
☐	L9	L8 and (logical near5 volume)	673
☐	L8	L7 and cluster$3	20839
☐	L7	(disk and volume and cluster$3)	20839
☐	L6	L5 and (mirror$3 near5 volume)	5
☐	L5	disk and epoch and read$3 and copy and value$1 and data and structure and volume and cluster$3	96
☐	L4	(disk near5 epoch) and (read$3 near5 epoch)	4
☐	L3	(read$3 and epoch and value$1 and mirroed and copy and logical and volume and disk)	0
☐	L2	(read$3 and epoch and value$1 and mirroed and copy and logical and volume and raid)	0
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Chendong Zou; Salzberg, B.; Ladin, R.;
Data Engineering, 1998. Proceedings., 14th International Conference on
23-27 Feb. 1998 Page(s):578 - 587
Digital Object Identifier 10.1109/ICDE.1998.655821
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Graefe, G.; Shapiro, L.D.;
Applied Computing, 1991., [Proceedings of the 1991] Symposium on
3-5 April 1991 Page(s):91
Digital Object Identifier 10.1109/SOAC.1991.143853
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De Rose, C.; Blanco, F.; Maillard, N.; Saikoski, K.; Novaes, R.; Richard, O.; Ri
Computer Architecture and High Performance Computing, 2002. Proceedings. on
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Gianinetto, M.; Villa, P.; Lechi, G.;
Geoscience and Remote Sensing, IEEE Transactions on
Volume 44, Issue 1, Jan. 2006 Page(s):236 - 243
Digital Object Identifier 10.1109/TGRS.2005.859952
AbstractPlus | Full Text: PDF(3368 KB) IEEE JNL
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Coleman, A.;
Product Engineering and Production, IRE Transactions on
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Embedded Software and Systems, 2005. Second International Conference on
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Digital Object Identifier 10.1109/ICESS.2005.1
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Jonathan Chien-Liang Liu; Jenwei Hsieh; Du, D.H.C.; Meng-Jou Lin;
Selected Areas in Communications, IEEE Journal on
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Liu, J.C.L.; Hsieh, J.; Du, D.H.C.; Mengjou Lin;
INFOCOM '96. Fifteenth Annual Joint Conference of the IEEE Computer Socie the Next Generation. Proceedings IEEE
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Hirai, T.;
Magnetics, IEEE Transactions on
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Kimura, K.; Demura, A.; Igarashi, T.; Takeyari, Y.;
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Williams, D.I.;
Storage and Recording Systems, 1994., International Conference on
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7. **CLARE-a CLAuse Retrieval Engine for large Prolog databases**
Kam-Fai Wong; Williams, M.H.;
VLSI and Architectures for Symbolic Processing, IEE Colloquium on
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Young, J.J.; Malshe, A.P.; Brown, W.D.; Lenihan, T.; Albert, D.; Ozguz, V.;
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Mukhopadhyay, S.; Changhong Tang; Huang, J.; Mulong Yu; Palakal, M.;
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Johnson, B.A.; Summers, R.L.; Cathcart, T.P.;

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Jun Wen; Rui Zhang; Xianliang Lu;
Machine Learning and Cybernetics, 2002. Proceedings. 2002 International Co
Volume 2, 4-5 Nov. 2002 Page(s):1102 - 1106 vol.2
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Wu, H.Q.; Chi, T.H.; Fang, J.Y.; Zhang, X.;
Geoscience and Remote Sensing Symposium, 2003. IGARSS '03. Proceeding International
Volume 6, 21-25 July 2003 Page(s):3790 - 3792 vol.6
Digital Object Identifier 10.1109/IGARSS.2003.1295271
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1 Petal: distributed virtual disks

Edward K. Lee, Chandramohan A. Thekkath

September 1996 **ACM SIGPLAN Notices , ACM SIGOPS Operating Systems Review , Proceedings of the seventh international conference on Architectural support for programming languages and operating systems ASPLOS-VII**, Volume 31 , 30 Issue 9 , 5

Publisher: ACM Press

Full text available: pdf(1.10 MB) Additional Information: full citation, abstract, references, citings, index terms

The ideal storage system is globally accessible, always available, provides unlimited performance and capacity for a large number of clients, and requires no management. This paper describes the design, implementation, and performance of Petal, a system that attempts to approximate this ideal in practice through a novel combination of features. Petal consists of a collection of network-connected servers that cooperatively manage a pool of physical disks. To a Petal client, this collection appear ...

2 SPV: secure path vector routing for securing BGP

Yih-Chun Hu, Adrian Perrig, Marvin Sirbu

August 2004 **ACM SIGCOMM Computer Communication Review , Proceedings of the 2004 conference on Applications, technologies, architectures, and protocols for computer communications SIGCOMM '04**, Volume 34 Issue 4

Publisher: ACM Press

Full text available: pdf(236.82 KB) Additional Information: full citation, abstract, references, index terms

As our economy and critical infrastructure increasingly relies on the Internet, the insecurity of the underlying border gateway routing protocol (BGP) stands out as the Achilles heel. Recent misconfigurations and attacks have demonstrated the brittleness of BGP. Securing BGP has become a priority.In this paper, we focus on a viable deployment path to secure BGP. We analyze security requirements, and consider tradeoffs of mechanisms that achieve the requirements. In particular, we study how to se ...

Keywords: BGP, Border Gateway Protocol, interdomain routing, routing, security

3 Improving storage system availability with D-GRAID

Muthian Sivathanu, Vijayan Prabhakaran, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau

May 2005 **ACM Transactions on Storage (TOS)**, Volume 1 Issue 2

Publisher: ACM Press
Full text available: pdf(700.30 KB) Additional Information: full citation, abstract, references, index terms

We present the design, implementation, and evaluation of D-GRAID, a gracefully degrading and quickly recovering RAID storage array. D-GRAID ensures that most files within the file system remain available even when an unexpectedly high number of faults occur. D-GRAID achieves high availability through aggressive replication of semantically critical data, and fault-isolated placement of logically related data. D-GRAID also recovers from failures quickly, restoring only live file system data to a h ...

Keywords: Block-based storage, Disk array, RAID, fault isolation, file systems, smart disks

4 Manageability, availability, and performance in porcupine: a highly scalable, cluster-based mail service
Yasushi Saito, Brian N. Bershad, Henry M. Levy
August 2000 **ACM Transactions on Computer Systems (TOCS)**, Volume 18 Issue 3
Publisher: ACM Press
Full text available: pdf(2.52 MB) Additional Information: full citation, abstract, references, index terms

This paper describes the motivation, design and performance of Porcupine, a scalable mail server. The goal of Porcupine is to provide a highly available and scalable electronic mail service using a large cluster of commodity PCs. We designed Porcupine to be easy to manage by emphasizing dynamic load balancing, automatic configuration, and graceful degradation in the presence of failures. Key to the system's manageability, availability, and performance is that sessions, data, and underlying ...

Keywords: cluster, distributed systems, email, group membership protocol, load balancing, replication

5 Lightweight recoverable virtual memory
M. Satyanarayanan, Henry H. Mashburn, Puneet Kumar, David C. Steere, James J. Kistler
December 1993 **ACM SIGOPS Operating Systems Review , Proceedings of the fourteenth ACM symposium on Operating systems principles SOSP '93**, Volume 27 Issue 5
Publisher: ACM Press
Full text available: pdf(1.53 MB) Additional Information: full citation, abstract, references, citings, index terms

Recoverable virtual memory refers to regions of a virtual address space on which transactional guarantees are offered. This paper describes *RVM*, an efficient, portable, and easily used implementation of recoverable virtual memory for Unix environments. A unique characteristic of RVM is that it allows independent control over the transactional properties of atomicity, permanence, and serializability. This leads to considerable flexibility in the use of RVM, potentially enlarging the ...

6 Lightweight recoverable virtual memory
M. Satyanarayanan, Henry H. Mashburn, Puneet Kumar, David C. Steere, James J. Kistler
February 1994 **ACM Transactions on Computer Systems (TOCS)**, Volume 12 Issue 1
Publisher: ACM Press
Full text available: pdf(1.73 MB) Additional Information: full citation, abstract, references, citings, index terms, review

Recoverable virtual memoryrefers to regions of a virtual address space on which

transactional guarantees are offered. This article describes RVM, an efficient, portable, and easily used implementation of recoverable virtual memory for Unix environments. A unique characteristic of RVM is that it allows independent control over the transactional properties of atomicity, permanence, and serializability. This leads to considerable flexibility in the use of RVM, potentially enla ...

Keywords: Camelot, Coda, RVM, Unix, logging, paging, persistence, scalability, throughput, truncation

7 The monitoring and early detection of internet worms
Cliff C. Zou, Weibo Gong, Don Towsley, Lixin Gao
October 2005 **IEEE/ACM Transactions on Networking (TON)**, Volume 13 Issue 5
Publisher: IEEE Press
Full text available: pdf(594.79 KB) Additional Information: full citation, abstract, references, index terms

After many Internet-scale worm incidents in recent years, it is clear that a simple self-propagating worm can quickly spread across the Internet and cause severe damage to our society. Facing this great security threat, we need to build an early detection system that can detect the presence of a worm in the Internet as quickly as possible in order to give people accurate early warning information and possible reaction time for counteractions. This paper first presents an Internet worm monitoring ...

Keywords: computer network security, early detection, internet worm, network monitoring

8 Hibernator: helping disk arrays sleep through the winter
Qingbo Zhu, Zhifeng Chen, Lin Tan, Yuanyuan Zhou, Kimberly Keeton, John Wilkes
October 2005 **ACM SIGOPS Operating Systems Review , Proceedings of the twentieth ACM symposium on Operating systems principles SOSP '05**, Volume 39 Issue 5
Publisher: ACM Press
Full text available: pdf(654.56 KB) Additional Information: full citation, abstract, references, index terms

Energy consumption has become an important issue in high-end data centers, and disk arrays are one of the largest energy consumers within them. Although several attempts have been made to improve disk array energy management, the existing solutions either provide little energy savings or significantly degrade performance for data center workloads.Our solution, Hibernator, is a disk array energy management system that provides improved energy savings while meeting performance goals. Hibernator co ...

Keywords: disk array, disk layout, energy management, performance guarantee, storage system

9 Distributed logging for transaction processing
Dean S. Daniels, Alfred Z. Spector, Dean S. Thompson
December 1987 **ACM SIGMOD Record , Proceedings of the 1987 ACM SIGMOD international conference on Management of data SIGMOD '87**, Volume 16 Issue 3
Publisher: ACM Press
Full text available: pdf(1.51 MB) Additional Information: full citation, abstract, references, citings, index terms

Increased interest in using workstations and small processors for distributed transaction processing raises the question of how to implement the logs needed for transaction recovery. Although logs can be implemented with data written to duplexed disks on each

processing node, this paper argues there are advantages if log data is written to multiple log server nodes. A simple analysis of expected logging loads leads to the conclusion that a high performance, microprocessor b ...

10 Gossip-based aggregation in large dynamic networks
Márk Jelasity, Alberto Montresor, Ozalp Babaoglu
August 2005 **ACM Transactions on Computer Systems (TOCS)**, Volume 23 Issue 3
Publisher: ACM Press
Full text available: pdf(533.89 KB) Additional Information: full citation, abstract, references, index terms

As computer networks increase in size, become more heterogeneous and span greater geographic distances, applications must be designed to cope with the very large scale, poor reliability, and often, with the extreme dynamism of the underlying network. *Aggregation* is a key functional building block for such applications: it refers to a set of functions that provide components of a distributed system access to global information including network size, average load, average uptime, location ...

Keywords: Gossip-based protocols, proactive aggregation

11 The Zebra striped network file system
John H. Hartman, John K. Ousterhout
August 1995 **ACM Transactions on Computer Systems (TOCS)**, Volume 13 Issue 3
Publisher: ACM Press
Full text available: pdf(2.76 MB) Additional Information: full citation, abstract, references, citings, index terms, review

Zebra is a network file system that increases throughput by striping the file data across multiple servers. Rather than striping each file separately, Zebra forms all the new data from each client into a single stream, which it then stripes using an approach similar to a log-structured file system. This provides high performance for writes of small files as well as for reads and writes of large files. Zebra also writes parity information in each stripe in the style of RAID disk arrays; this ...

Keywords: RAID, log-based striping, log-structured file system, parity computation

12 The TickerTAIP parallel RAID architecture
Pei Cao, Swee Boon Lin, Shivakumar Venkataraman, John Wilkes
August 1994 **ACM Transactions on Computer Systems (TOCS)**, Volume 12 Issue 3
Publisher: ACM Press
Full text available: pdf(2.04 MB) Additional Information: full citation, abstract, references, citings, index terms

Traditional disk arrays have a centralized architecture, with a single controller through which all requests flow. Such a controller is a single point of failure, and its performance limits the maximum number of disks to which the array can scale. We describe TickerTAIP, a parallel architecture for disk arrays that distributes the controller functions across several loosely coupled processors. The result is better scalability, fault tolerance, and flexibility.This article present ...

Keywords: RAID disk array, decentralized parity calculation, disk scheduling, distributed controller, fault tolerance, parallel controller, performance simulation

13
Epochs, configuration schema, and version cursors in the KBSA framework CCM

model
John Kimball, Aaron Larson
May 1991 **Proceedings of the 3rd international workshop on Software configuration management**
Publisher: ACM Press
Full text available: pdf(1.06 MB) Additional Information: full citation, references, index terms

14 The TickerTAIP parallel RAID architecture
Pei Cao, Swee Boon Lim, Shivakumar Venkataraman, John Wilkes
May 1993 **ACM SIGARCH Computer Architecture News , Proceedings of the 20th annual international symposium on Computer architecture ISCA '93**, Volume 21 Issue 2
Publisher: ACM Press
Full text available: pdf(1.19 MB) Additional Information: full citation, abstract, references, citings, index terms

Traditional disk arrays have a centralized architecture, with a single controller through which all requests flow. Such a controller is a single point of failure, and its performance limits the maximum size that the array can grow to. We describe here TickerTAIP, a parallel architecture for disk arrays that distributed the controller functions across several loosely-coupled processors. The result is better scalability, fault tolerance, and flexibility. This paper presents the Tic ...

15 Implementing sequentially consistent shared objects using broadcast and point-to-point communication
Alan Fekete, M. Frans Kaashoek, Nancy Lynch
January 1998 **Journal of the ACM (JACM)**, Volume 45 Issue 1
Publisher: ACM Press
Full text available: pdf(257.13 KB) Additional Information: full citation, abstract, references, citings, index terms

This paper presents and proves correct a distributed algorithm that implements a sequentially consistent collection of shared read/update objects. This algorithm is a generalization of one used in the Orca shared object system. The algorithm caches objects in the local memory of processors according to application needs; each read operation accesses a single copy of the object, while each update accesses all copies. The algorithm uses broadcast communication when it sends messages to replic ...

Keywords: Orca programming language, distributed shared memory, formal methods, input/output automata, ordered multicast, replicated data

16 Tolerating multiple failures in RAID architectures with optimal storage and uniform declustering
Guillermo A. Alvarez, Walter A. Burkhard, Flaviu Cristian
May 1997 **ACM SIGARCH Computer Architecture News , Proceedings of the 24th annual international symposium on Computer architecture ISCA '97**, Volume 25 Issue 2
Publisher: ACM Press
Full text available: pdf(1.50 MB) Additional Information: full citation, abstract, references, citings, index terms

We present DATUM, a novel method for tolerating multiple disk failures in disk arrays. DATUM is the first known method that can mask any given number of failures, requires an optimal amount of redundant storage space, and spreads reconstruction accesses uniformly over disks in the presence of failures without needing large layout tables in

controller memory. Our approach is based on information dispersal, a coding technique that admits an efficient hardware implementation. As t ...

17 The Zebra striped network file system
John H. Hartman, John K. Ousterhout
December 1993 **ACM SIGOPS Operating Systems Review , Proceedings of the fourteenth ACM symposium on Operating systems principles SOSP '93**, Volume 27 Issue 5
Publisher: ACM Press
Full text available: pdf(1.93 MB) Additional Information: full citation, abstract, references, citings, index terms

Zebra is a network file system that increases throughput by striping file data across multiple servers. Rather than striping each file separately, Zebra forms all the new data from each client into a single stream, which it then stripes using an approach similar to a log-structured file system. This provides high performance for writes of small files as well as for reads and writes of large files. Zebra also writes parity information in each stripe in the style of RAID disk arrays; this increase ...

18 A 50-Gb/s IP router
Craig Partridge, Philip P. Carvey, Ed Burgess, Isidro Castineyra, Tom Clarke, Lise Graham, Michael Hathaway, Phil Herman, Allen King, Steve Kohalmi, Tracy Ma, John Mcallen, Trevor Mendez, Walter C. Milliken, Ronald Pettyjohn, John Rokosz, Joshua Seeger, Michael Sollins, Steve Storch, Benjamin Tober, Gregory D. Troxel
June 1998 **IEEE/ACM Transactions on Networking (TON)**, Volume 6 Issue 3
Publisher: IEEE Press
Full text available: pdf(133.28 KB) Additional Information: full citation, references, citings, index terms, review

Keywords: data communications, internetworking, packet switching, routing

19 Guide for the use of the Ada Ravenscar Profile in high integrity systems
Alan Burns, Brian Dobbing, Tullio Vardanega
June 2004 **ACM SIGAda Ada Letters**, Volume XXIV Issue 2
Publisher: ACM Press
Full text available: pdf(548.17 KB) Additional Information: full citation, references

20 Routing: Ensuring cache freshness in on-demand ad hoc network routing protocols
Yih-Chun Hu, David B. Johnson
October 2002 **Proceedings of the second ACM international workshop on Principles of mobile computing**
Publisher: ACM Press
Full text available: pdf(131.62 KB) Additional Information: full citation, abstract, references, citings, index terms

In a wireless ad hoc network, nodes cooperate to forward packets for each other over possibly multi-hop paths, to allow nodes not within direct wireless transmission range to communicate. Many routing protocols have been proposed for the ad hoc network environment, several of which operate on-demand and utilize a *route cache* listing links that this node has learned. In such protocols, aggressive caching of overheard routes can significantly improve performance; in particular, overhead can ...

Keywords: DSR, Dynamic Source Routing, ad hoc networks, bounded latency, epoch numbers, route cache, theory

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1 Hierarchical disk cache management in RAID 5 controller
Jung-ho Huh, Tae-mu Chang
December 2003 **Journal of Computing Sciences in Colleges**, Volume 19 Issue 2
Publisher: Consortium for Computing Sciences in Colleges
Full text available: pdf(137.71 KB) Additional Information: full citation, abstract, references, index terms

In RAID system, disk cache is one of the important elements in improving the system performance. Two-level cache displays superior performance in comparison to single cache and is effective in temporal and spatial locality. The proposed cache system consists in two levels. The first level cache is a set associative cache with small block size whereas the second level cache is a fully associative cache with large block size. In this paper, a RAID 5 disk cache model is presented that is located on ...

2 Data partitioning and load balancing in parallel disk systems
Peter Scheuermann, Gerhard Weikum, Peter Zabback
February 1998 **The VLDB Journal — The International Journal on Very Large Data Bases**, Volume 7 Issue 1
Publisher: Springer-Verlag New York, Inc.
Full text available: pdf(310.27 KB) Additional Information: full citation, abstract, citings, index terms

Parallel disk systems provide opportunities for exploiting I/O parallelism in two possible ways, namely via inter-request and intra-request parallelism. In this paper, we discuss the main issues in performance tuning of such systems, namely striping and load balancing, and show their relationship to response time and throughput. We outline the main components of an intelligent, self-reliant file system that aims to optimize striping by taking into account the requirements of the applications, an ...

Keywords: Data allocation, Disk cooling, File striping, Load balancing, Parallel disk systems, Performance tuning

3 Technology to enable learning: Strategic decisions on technology selections for facilitating a network/systems laboratory using real options & total cost of ownership theories
Kimfong Lei, Phillip T. Rawles
October 2003 **Proceedings of the 4th conference on Information technology curriculum CITC4 '03**
Publisher: ACM Press

Full text available: pdf(407.50 KB) Additional Information: full citation, abstract, references, index terms

This paper addresses the selection of technologies that provide each student group a dedicated environment on a non-dedicated host machine. The authors investigated different combinations of enabling technologies and approaches, such as virtual machine technology, storage technology, and host operating system. Performance tests were developed and executed to profile the performance of the technologies. The results of this work provide an evaluation of the studied technologies and a selection gui ...

Keywords: VMware, course development, curriculum, end-user computing, innovative lab strategies in IT, interesting applications in IT, networking, operating systems, systems software

4 False sharing problems in cluster-based disk arrays
Hai Jin, Kai Hwang
February 1999 **Proceedings of the 1999 ACM symposium on Applied computing**
Publisher: ACM Press
Full text available: pdf(618.92 KB) Additional Information: full citation, references, index terms

Keywords: RAID, clusters of workstations, false sharing, storage system architecture

5 The HP AutoRAID hierarchical storage system
John Wilkes, Richard Golding, Carl Staelin, Tim Sullivan
February 1996 **ACM Transactions on Computer Systems (TOCS)**, Volume 14 Issue 1
Publisher: ACM Press
Full text available: pdf(1.82 MB) Additional Information: full citation, abstract, references, citings, index terms

Configuring redundant disk arrays is a black art. To configure an array properly, a system administrator must understand the details of both the array and the workload it will support. Incorrect understanding of either, or changes in the workload over time, can lead to poor performance. We present a solution to this problem: a two-level storage hierarchy implemented inside a single disk-array controller. In the upper level of this hierarchy, two copies of active data are stored to provide f ...

Keywords: RAID, disk array, storage hierarchy

6 X-RAY: A Non-Invasive Exclusive Caching Mechanism for RAIDs
Lakshmi N. Bairavasundaram, Muthian Sivathanu, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau
March 2004 **ACM SIGARCH Computer Architecture News , Proceedings of the 31st annual international symposium on Computer architecture ISCA '04**, Volume 32 Issue 2
Publisher: IEEE Computer Society, ACM Press
Full text available: pdf(250.59 KB) Additional Information: full citation, abstract, citings

RAID storage arrays often possess gigabytes of RAM forcaching disk blocks. Currently, most RAID systems use LRUor LRU-like policies to manage these caches. Since these arraycaches do not recognize the presence of file system buffer caches,they redundantly retain many of the same blocks as those cachedby the file system, thereby wasting precious cache space. In thispaper, we introduce X-RAY, an exclusive RAID array cachingmechanism. X-RAY achieves a high degree of (but not perfect) exclusivitythr ...

7 Virtual memory and backing storage management in multiprocessor operating systems using object-oriented design techniques
V. F. Russo, R. H. Campbell
September 1989 **ACM SIGPLAN Notices , Conference proceedings on Object-oriented programming systems, languages and applications OOPSLA '89**, Volume 24 Issue 10
Publisher: ACM Press
Full text available: pdf(1.19 MB) Additional Information: full citation, abstract, references, citings, index terms

The Choices operating system architecture [3, 4, 15] uses class hierarchies and object-oriented programming to facilitate the construction of customized operating systems for shared memory and networked multiprocessors. The software is being used in the Tapestry Parallel Computing Laboratory at the University of Illinois to study the performance of algorithms, mechanisms, and policies for parallel systems. This paper describes the architectural design and class hierarchy of ...

8 Computing curricula 2001
September 2001 **Journal on Educational Resources in Computing (JERIC)**
Publisher: ACM Press
Full text available: pdf(613.63 KB) html(2.78 KB) Additional Information: full citation, references, citings, index terms

9 Disk cache—miss ratio analysis and design considerations
Alan J. Smith
August 1985 **ACM Transactions on Computer Systems (TOCS)**, Volume 3 Issue 3
Publisher: ACM Press
Full text available: pdf(3.13 MB) Additional Information: full citation, abstract, references, citings, index terms, review

The current trend of computer system technology is toward CPUs with rapidly increasing processing power and toward disk drives of rapidly increasing density, but with disk performance increasing very slowly if at all. The implication of these trends is that at some point the processing power of computer systems will be limited by the throughput of the input/output (I/O) system. A solution to this problem, which is described and evaluated in this paper, is disk cache

10 The HP AutoRAID hierarchical storage system
J. Wilkes, R. Golding, C. Staelin, T. Sullivan
December 1995 **ACM SIGOPS Operating Systems Review , Proceedings of the fifteenth ACM symposium on Operating systems principles SOSP '95**, Volume 29 Issue 5
Publisher: ACM Press
Full text available: pdf(1.60 MB) Additional Information: full citation, references, citings, index terms

11 The Zebra striped network file system
John H. Hartman, John K. Ousterhout
August 1995 **ACM Transactions on Computer Systems (TOCS)**, Volume 13 Issue 3
Publisher: ACM Press
Full text available: pdf(2.76 MB) Additional Information: full citation, abstract, references, citings, index terms, review

Zebra is a network file system that increases throughput by striping the file data across multiple servers. Rather than striping each file separately, Zebra forms all the new data

from each client into a single stream, which it then stripes using an approach similar to a log-structured file system. This provides high performance for writes of small files as well as for reads and writes of large files. Zebra also writes parity information in each stripe in the style of RAID disk arrays; this ...

Keywords: RAID, log-based striping, log-structured file system, parity computation

12 The automatic improvement of locality in storage systems
Windsor W. Hsu, Alan Jay Smith, Honesty C. Young
November 2005 **ACM Transactions on Computer Systems (TOCS)**, Volume 23 Issue 4
Publisher: ACM Press
Full text available: pdf(2.58 MB) Additional Information: full citation, abstract, references, index terms

Disk I/O is increasingly the performance bottleneck in computer systems despite rapidly increasing disk data transfer rates. In this article, we propose Automatic Locality-Improving Storage (ALIS), an introspective storage system that automatically reorganizes selected disk blocks based on the dynamic reference stream to increase effective storage performance. ALIS is based on the observations that sequential data fetch is far more efficient than random access, that improving seek distances prod ...

Keywords: Data layout optimization, block layout, data reorganization, data restructuring, defragmentation, disk technology trends, locality improvement, prefetching

13 LH^*_{RS}---a highly-available scalable distributed data structure
Witold Litwin, Rim Moussa, Thomas Schwarz
September 2005 **ACM Transactions on Database Systems (TODS)**, Volume 30 Issue 3
Publisher: ACM Press
Full text available: pdf(774.32 KB) Additional Information: full citation, abstract, references, index terms

LH*RS is a high-availability scalable distributed data structure (SDDS). An LH*RS file is hash partitioned over the distributed RAM of a multicomputer, for example, a network of PCs, and supports the unavailability of any *k* ≥ 1 of its server nodes. The value of *k* transparently grows with the file to offset the reliability decline. Only the number of the storage nodes potentially limits the file growth. The high-availability management uses a novel ...

Keywords: P2P, Scalable distributed data structure, grid computing, high-availability, linear hashing, physical database design

14 Compiler-based I/O prefetching for out-of-core applications
Angela Demke Brown, Todd C. Mowry, Orran Krieger
May 2001 **ACM Transactions on Computer Systems (TOCS)**, Volume 19 Issue 2
Publisher: ACM Press
Full text available: pdf(499.03 KB) Additional Information: full citation, abstract, references, citings, index terms, review

Current operating systems offer poor performance when a numeric application's working set does not fit in main memory. As a result, programmers who wish to solve "out-of-core" problems efficiently are typically faced with the onerous task of rewriting an application to use explicit I/O operations (e.g., read/write). In this paper, we propose and evaluate a fully automatic technique which liberates the programmer from this task, provides high performance, and requires only minima ...

Keywords: compiler optimization, prefetching, virtual memory

15 External memory algorithms and data structures: dealing with **massive data**
Jeffrey Scott Vitter
June 2001 **ACM Computing Surveys (CSUR)**, Volume 33 Issue 2
Publisher: ACM Press
Full text available: pdf(828.46 KB) Additional Information: full citation, abstract, references, citings, index terms

Data sets in large applications are often too massive to fit completely inside the computers internal memory. The resulting input/output communication (or I/O) between fast internal memory and slower external memory (such as disks) can be a major performance bottleneck. In this article we survey the state of the art in the design and analysis of external memory (or EM) algorithms and data structures, where the goal is to exploit locality in order to reduce the I/O costs. We consider a varie ...

Keywords: B-tree, I/O, batched, block, disk, dynamic, extendible hashing, external memory, hierarchical memory, multidimensional access methods, multilevel memory, online, out-of-core, secondary storage, sorting

16 I/O reference behavior of production database workloads and the TPC benchmarks—an analysis at the logical level
Windsor W. Hsu, Alan Jay Smith, Honesty C. Young
March 2001 **ACM Transactions on Database Systems (TODS)**, Volume 26 Issue 1
Publisher: ACM Press
Full text available: pdf(5.42 MB) Additional Information: full citation, abstract, references, citings, index terms

As improvements in processor performance continue to far outpace improvements in storage performance, I/O is increasingly the bottleneck in computer systems, especially in large database systems that manage huge amoungs of data. The key to achieving good I/O performance is to thoroughly understand its characteristics. In this article we present a comprehensive analysis of the logical I/O reference behavior of the peak productiondatabase workloads from ten of the world's largest corporatio ...

Keywords: I/O, TPC benchmarks, caching, locality, prefetching, production database workloads, reference behavior, sequentiality, workload characterization

17 Application performance and flexibility on exokernel systems
M. Frans Kaashoek, Dawson R. Engler, Gregory R. Ganger, Hector M. Briceño, Russell Hunt, David Mazières, Thomas Pinckney, Robert Grimm, John Jannotti, Kenneth Mackenzie
October 1997 **ACM SIGOPS Operating Systems Review , Proceedings of the sixteenth ACM symposium on Operating systems principles SOSP '97**, Volume 31 Issue 5
Publisher: ACM Press
Full text available: pdf(2.39 MB) Additional Information: full citation, references, citings, index terms

18 The Zebra striped network file system
John H. Hartman, John K. Ousterhout
December 1993 **ACM SIGOPS Operating Systems Review , Proceedings of the fourteenth ACM symposium on Operating systems principles SOSP '93**, Volume 27 Issue 5

Publisher: ACM Press

Full text available: pdf(1.93 MB) Additional Information: full citation, abstract, references, citings, index terms

Zebra is a network file system that increases throughput by striping file data across multiple servers. Rather than striping each file separately, Zebra forms all the new data from each client into a single stream, which it then stripes using an approach similar to a log-structured file system. This provides high performance for writes of small files as well as for reads and writes of large files. Zebra also writes parity information in each stripe in the style of RAID disk arrays; this increase ...

19 Asynchronous scheduling of redundant disk arrays

Peter Sanders

July 2000 **Proceedings of the twelfth annual ACM symposium on Parallel algorithms and architectures**

Publisher: ACM Press

Full text available: pdf(161.35 KB) Additional Information: full citation, abstract, references, citings, index terms

Random redundant allocation of data to parallel disk arrays can be exploited to achieve low access delays. New algorithms are proposed which improve the previously known shortest queue algorithm by systematically exploiting that scheduling decisions can be deferred until a block access is actually started on a disk. These algorithms are also generalized for coding schemes with low redundancy. Using extensive experiments, practically important quantities are measured which have so far eluded ...

20 General storage protection techniques: Ensuring data integrity in storage: techniques and applications

Gopalan Sivathanu, Charles P. Wright, Erez Zadok

November 2005 **Proceedings of the 2005 ACM workshop on Storage security and survivability StorageSS '05**

Publisher: ACM Press

Full text available: pdf(217.83 KB) Additional Information: full citation, abstract, references, index terms

Data integrity is a fundamental aspect of storage security and reliability. With the advent of network storage and new technology trends that result in new failure modes for storage, interesting challenges arise in ensuring data integrity. In this paper, we discuss the causes of integrity violations in storage and present a survey of integrity assurance techniques that exist today. We describe several interesting applications of storage integrity checking, apart from security, and discuss the im ...

Keywords: file systems, intrusion detection, storage integrity

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Authors Edward K. Lee Systems Research Center, Digital Equipment Corporation, 130 Lytton Ave, Palo Alto, CA
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Sponsors SIGPLAN: ACM Special Interest Group on Programming Languages
SIGOPS: ACM Special Interest Group on Operating Systems
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Networks **1999**], although nothing in the system prevents their use. ... coordinator broadcasts the new membership and **epoch** ID to all nodes. ...
www.cs.washington.edu/homes/levy/porcupine.pdf - Similar pages

Thu May 10 17:24:54 PDT 2001 * Release Orca version 0.27b1. Thu ...
Wed Oct 20 17:37:01 PDT **1999** * Fix that annoying warning from pod2html when orca.html ... Now all classes use File **IDentifiers** (FIDs) instead of filenames. ...
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NEW IN ORCA 0.27 =============== Released November 14, 2002. 1 ...
The subroutine should return the Unix **epoch** time. ... 11) Use a new integer file **identifier** (FID) instead of the filename to refer to in internal objects. ...
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the **epoch** number at each change in the layout, and ensures. that the manager and all non-failed ... building distributed **RAID**-5 disk arrays. The data access ...
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structure of the Internet and intranet servers **RAID** (Redundant Array of Inexpensive Disks).

arrays. In **Epoch** 2, each fascicle (for example, a DVD) contains ...
navigatela.lacity.org/.../vault_record/ Records%20Management%20Plan%20v010.pdf&category=vault_record - Similar pages

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File Format: Adobe PostScript - View as HTML
to use a large monolithic server with re-liable storage (eg, **RAID** [Chen et al. ... Each entry in the user map is associated with an **epoch** ID that shows when ...
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Storage-Aware Caching: Revisiting Caching for ... - by Forney - 13 citations

[PDF] Manageability, Availability and Performance in Porcupine: A Highly ...
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and manageability at high **volume** are demanded. For example, Usenet news, community ... We then configured a two node **cluster**, each with one IDE **disk** and ...
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Related block level storage systems include **RAID** II [7] TickerTAIP [5] **Logical Disk** [8], Loge [10] Mime [6] AutoRAID [19] and Swift [4] Some of these ...
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File Format: PDF/Adobe Acrobat
a **RAID** system. **Volume** formation information, called vol- ... When a provider detects a **disk** failure, it also increments the **epoch** num- ...
www.cs.ucsb.edu/research/ tech_reports/reports/2002-32.pdf - Similar pages

The HP AutoRAID hierarchical storage system
Striping in a **RAID** level-5 **disk** array. Tech. Pep. CSE-TR- 181-93, ... 20 **EPOCH** SYSTEMS. 1988. Mass storage: Server puts optical discs on line for ...
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configured a two-node **cluster**, each with one IDE **disk** and two SCSI disks. ... 1998; Sun Microsystems **1999**]). These **clusters** are often designed specifi- ...
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The Big Brother FTP Archive Index
... to check for stale **logical volumes** and volumegroups for unavailable disks ... **1999**/10/20, 1418, ods.sh, A script to monitor Suns Online **Disk** Suite **RAID**. ...
www.deadcat.net.au/cgi-bin/BB.pl - 249k - Apr 15, 2006 - Cached - Similar pages

[PDF] Track-Based **Disk** Logging
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Trail log **disk** when the Trail driver boots up. The **epoch**. field is incremented each time when ... **clusters disk** access activities that could have been more ...
doi.ieeecomputersociety.org/10.1109/DSN.2002.1028928 - Similar pages

[PS] SEMANTICALLY-SMART **DISK** SYSTEMS by Muthian Sivathanu BE Computer ...
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For example, even 2 failures in a 10 **disk RAID** system would result in ... In such a scenario, D-GRAID can be run at the **logical volume** manager level, ...

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Linux Weekly News
Ciprico Inc. (MINNEAPOLIS) announced that its 6500 Series **RAID disk** array is now ...
Linux **Logical Volume** Management HOWTO, 0.0.1, A HOWTO describing Linux ...
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RAID disk storage. Customers with storage needs that are ... Aggregates cannot be larger than the **logical volume** in which they. are contained. ...
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Storage Mountain: AMANDA Book Excerpt 23
This is an excerpt from the book Unix **Backup** & Recovery. ... print &ctime ($_); } exit (0); $ **epoch**.pl 916549924 Sun Jan 17 0:12:04 US/East-Indiana **1999** ...
www.**backup**central.com/amanda-23.html - 20k - Cached - Similar pages

1999: Summary: **Backup** - ufsdump question
The idea is that ufsdump will only **backup** more than one file / directory if ... to back the two filesystems on the first tape drive, **epoch** level, eject ...
www.sunmanagers.org/archives/**1999**/1822.html - 6k - Cached - Similar pages

Palmdump
Most Unix and POSIX-compatible programs use a different **epoch** or date and time ... **1999** Modification time: Palm time: Mon Jul 12 19:31:39 **1999** **Backup** time: ...
www.fourmilab.ch/palm/palmdump/ - 13k - Cached - Similar pages

docs.sun.com: System Administration Guide, Volume 1
... 13 10:46:09 **1999** DUMP: Date of last level 0 dump: the **epoch** DUMP: Dumping ... The following example shows an incremental **backup** of the root (/) file ...
docs.sun.com/app/docs/doc/805-7228/6j6q7uf1d?a=view - 29k - Cached - Similar pages

> docs.sun.com: System Administration Guide, Volume 1
> Preparing to **back up** file systems begins with planning, ... level 0 dump: Tue Jul 13 10:46:09 **1999** DUMP: Date of last level 0 dump: the **epoch** DUMP: Dumping ...
> docs.sun.com/app/docs/doc/805-7228/6j6q7uf1a?a=view - 34k - Cached - Similar pages

BackupFAQs < CSDocs < TWiki
Incremental and **epoch** backups (see What Are Backups?) are made from the **backup** volume. This means that a file from an AFS volume can only be restored to ...
www.cs.wisc.edu/twiki/bin/view/CSDocs/BackupFAQs - 15k - Cached - Similar pages

CDDIS | Bulletin Volume 15, No. 3
Epoch: March 15, 1992, TLRS-1 range bias is +11 mm range bias ... Since the December **1999** issue of the CDDIS Bulletin, the CDDIS has archived daily and ...
cddis.nasa.gov/bulletin_v15n3.html - 38k - Cached - Similar pages

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Time (days) past UTC OO:OO:OO, 1 l/06/**1999**. Figure 4: Primary GUS Processing (GP) Clock Steering for AOR-W (Clarksburg, MD). **Backup** GP Clock Steering ...
tycho.usno.navy.mil/ptti/ptti99/PTTI_**1999**_173.PDF - Similar pages

System and method for restoring a file system from backups in the ...
5974563, Oct., **1999**, Beeler, Jr. 6073128, Jun., 2000, Pongracz et al. ... Deletion events for

the files that have survived a **back-up epoch** are recorded in a ...
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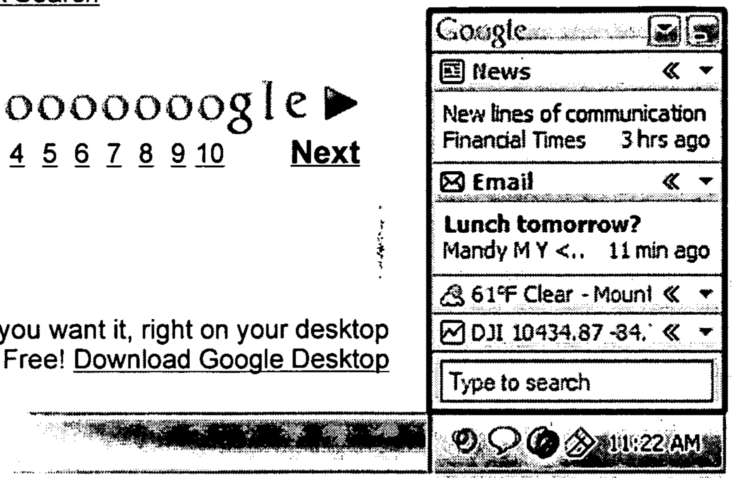

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data-storage-systems.globalspec.com/ Industrial-Directory/data_storages_external - 80k - Cached - Similar pages

[PS] Astronomical Data Analysis Software and Systems VIII ASP ...
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269 c fl Copyright **1999** Astronomical Society of the Pacific. ... **disk** farm lots of large **disks**, **backup** on DLT $64/GB yes **RAID** farm lots of (level-5) **RAID** ...
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The Prospects of DVD-R for Storing Astronomical Archive Data
Magnetic **disk** systems are **RAID** (Redundant Array of Inexpensive **Disks**) systems: their cost is increased to account for a necessary **backup** on say tapes or for ...
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with specialization in **backup** and recovery, storage, database, and ... system **disks** and Winchester **RAID** Array. Detailed build notes were ...
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ing the previous **epoch** for each **disk**. (1) If the percentage of ... Grunwald [8] proposed a **disk backup** organization called. MAID that uses power management ...
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Is it acceptable to lose any data if a **disk** failure ... In the **epoch** algorithm [4] each **backup** server ... separate **RAID** devices [5]. These systems are ...
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Power-Aware Storage Cache Management
In each **epoch**, we keep track of the interval length between two consecutive ... Colarelli and Grunwald [8] proposed a **disk backup** organization called MAID ...
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[Citations: The Logical **Disk**: A New Approach to Improving File ...]
None of these supported multiple storage levels, and none was targeted at **RAID** arrays. Work on an Extended Function Controller at HP s **disk** divisions in the ...
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W. Jonge, M. F. Kaashoek, and W. C. Hsieh. *The Logical Disk: A New Approach to Improving File Systems*. In Proceedings of the Fourteenth Symposium on Operating Systems Principles, 1993.

This paper is cited in the following contexts:

First 50 documents

An Age-Threshold Algorithm for Garbage Collection in.. - Menon, Stockmeyer (1998) (1 citation) (Correct)

....the file system. **Because** LSA is implemented in an outboard controller which has no understanding of files, it is more appropriate to think of LSA as a log structured track manager rather than a log structured file system. **In this respect, LSA has some similarities to Loge [4] and to Logical Disk [3], both of which are implemented below the file system.** In LSA, updated data is written into new disk locations instead of being written in place. **Large** amounts of updated data are collected in controller memory and written together to a contiguous segment on the disks. **Parity** on this data is also ....

W. de Jonge, M. F. Kaashoek, and W. C. Hsieh, *The logical disk: a new approach to improving file systems*, Proc. 14th ACM Symposium on Operating System Principles, Dec. 1993, Asheville, NC, pp. 15--28.

FT-NFS: an Efficient Fault Tolerant NFS Server Designed for.. - Peyrouze, Muller (1996) (2 citations) (Correct)

....within the container. **It** is therefore impossible to use directly the Unix names of the files. **This led us to design a second file system at the user INRIA FT NFS: an Efficient Fault Tolerant NFS Server for Off the shelf Workstations 11 level and to separate file management from disk management [21], the latter being provided by Unix.** Instead of being internally denoted by an inode, a file in FT NFS is named with an ID. **A** first consequence of this choice is that file attributes are kept contiguously with the file data to allow the implementation of hardware links. **This** has the important ....

W. de Jonge, M.F. Kaashoek, and W.C. Hsieh. *The logical disk: A new approach to improving file systems*. In Proc. of 14th ACM Symposium on Operating Systems Principles, December 1993.

Simplifying Distributed File Systems Using a Shared Logical Disk - Shillner, Felten (1996) (6 citations) (Correct)

....view to users. **The** result is a major simplification of the file system implementation. **Our** approach is based on picking some ideas from the work of others, and combining them with some new ideas, particularly in the area of fault tolerance. **From de Jonge et al. we take the logical disk concept [8], which we extend to the distributed case.** From Attanasio et al. we take the idea of striping a logical device across distributed physical devices [2] which we extend by adding caching and cache coherence. **From** Mann et al. we take the idea of expressing consistency requirements as ordering ....

....extend by applying it to cache to cache transfers. **The** result of combining these ideas, and adding some support for fault tolerance, is a base layer that makes it easy to write non centralized distributed file systems. 1. **1 Logical disk The shared logical disk is based on concept of logical disk [8].** A logical disk is an array of fixed size data blocks, which processes may use to stably store persistent data. **Processes** refer to the data blocks via logical block numbers; the logical disk maps these block numbers onto physical disk addresses. **The** logical disk is free to store the blocks at any ....

[Article contains additional citation context not shown here]

Wiedbren de Jonge, M. Frans Kaashoek, and Wilson C. Hsieh. *The logical disk: A new approach to improving file systems*. In Proceedings of the 14th Symposium on Operating System Principles, pages 15--28, 1993.

Symphony: An Integrated Multimedia File System - Shenoy, Goyal, Rao, Vin (1997) (27 citations) (Correct)

....the storage space is statically partitioned and the disk bandwidth is dynamically shared by logical volumes. **In** contrast, Symphony is a physically integrated file system, in which both storage space and disk bandwidth are dynamically shared among data types. **Finally, the logical disk abstraction [15] provides an interface that allows multiple file systems to coexist on a single storage device.** Logical disks provide functionalities similar to those provided by the data type independent layer of Symphony, such as multiple block sizes, location hints, etc. **However**, a key difference between ....

W. Jonge, M. F. Kaashoek, and W. C. Hsieh. *The Logical Disk: A New Approach to Improving File Systems.* In Proceedings of the Fourteenth Symposium on Operating Systems Principles, 1993.

A Comparison of Two Distributed Disk Systems - Lee, Thekkath, Whitaker, Hogg (1991) (1 citation) (Correct)

....sites because they only require access to a general purpose network and, by necessity, are designed to handle intermittent communication failures between nodes. 3. **2 Address Mapping Storage systems that manage multiple disks typically support virtual disk abstractions to simplify management [6, 19].** A virtual disk can span multiple physical disks for performance, mirror data for reliability, and can implement a variety of administrative policies. **When** clients access a virtual disk, the virtual disk addresses must be mapped to the corresponding physical disk addresses. **Most** storage systems ....

Wiebren de Jonge, M. Frans Kaashoek, and Wilson C. Hsieh. *The logical disk: A new approach to improving file systems.* In Proceedings of the ACM Symposium on Operating Systems Principles, pages 15--28, 1989.

A Comparison of Two Distributed Disk Systems - Lee, Thekkath, Whitaker, Hogg (1991) (1 citation) (Correct)

....and users become more sophisticated and increase beyond what can easily be satisfied by a few disk array controllers, managing the many disparate components of the storage system becomes a severe problem. **There has been considerable research devoted to designing large scale storage systems [1 3, 5, 8, 10, 14, 18, 19].** A distributed disk system is a class of storage system that can reduce the complexity of building and managing large scale storage systems. **Distributed** disk systems manage collections of disks shared by, or partitioned across, multiple nodes as a single logical storage system that is highly ....

Wiebren de Jonge, M. Frans Kaashoek, and Wilson C. Hsieh. *The logical disk: A new approach to improving file systems.* In Proceedings of the 14th ACM Symposium on Operating Systems Principles, pages 15--28, December 1989.

A Case for Compositional File Systems - Bordawekar (Correct)

.... **languages: Modula 3 or Java or C 6 Related Work The basic design approach uses the end to end argument [SRC84] The end to end argument has been used for designing operating and file systems [LS79, EKJ95] Other key projects that have influenced this design are: Exokernel Virtual disk [dJKH93] NASD file systems [GNA 97] xFS [ADN 96] Frangipani [TML97] HFS [Kri94] Forum [GSSW95] and Windows NTFS [Nag97, RvlG97] 7 Summary Traditional file systems suffer from the following disadvantages: application specific design, monolithic functional structure, and client server** ....

W. de Jonge, M. Frans Kaashoek, and W. C. Hsieh. *The Logical Disk: A New Approach to Improving File Systems.* In Proceedings of the Fourteenth Symposium on Operating Systems Principles, December 1993.

MiSFIT: A Freely Available Tool for Building Safe Extensible Systems - Small (Correct)

....each test representing a class of possible OS extensions. **We** include a short description of each test; for more detail, the reader is directed to the earlier paper. **hotlist**: choose which page to evict from a linked list of page descriptors. **lld: simulate the operation of a logical disk layer [DeJon93].** 6 . md5: compute the MD5 checksum [RFC1321] of 1MB of data. **The** tests were run on a 120MHz Pentium with 64MB of EDO memory, running BSD OS 2.1. **Each** test and its data easily fits into main memory. **We** report times relative to the unprotected version of the code. **The** results are found in Table ....

de Jonge, W., Kaashoek, M. F., Hsieh, W., "*The Logical Disk: A New Approach to Improving File Systems,*"

Proceedings of the 14th SOSP, 15–28, Asheville, NC (December 1993).

xFS: A Wide Area Mass Storage File System - Wang (1993) (16 citations) (Correct)

....table entry is of the following form: block ID # of blocks device address As data migrate among different storage levels, we simply change the corresponding translation tables, a simpler and cleaner approach than extending the existing UFS data structures. **This is similar to the approach taken by [7] where logical disk addresses are mapped to physical ones to allow a clean separation between file and disk management without sacrificing performance.** The memory management analogy, unfortunately, does not apply for data layout. **Firstly**, unlike processor caches which are usually direct mapped, we ....

W. de Jonge, M. F. Kaashoek, and W. Hsieh. *The Logical Disk: A New Approach to Improving File System Performance*. Proceedings of the 14th Symposium on Operating Systems Principles, December 1993. To appear.

The Swarm Scalable Storage System - John Hartman (1999) (8 citations) (Correct)

....as seen by a file system. **data** structures in the log. **This is similar to running the LFS cleaner at user level, and enjoys the same advantages [15] Other examples of possible services are an atomic recovery unit (ARU) 6] service that provides atomicity across multiple log writes; a logical disk [4] service that provides a disk abstraction that hides the append only log, allowing higher level services and applications to overwrite the blocks they store; a caching service that caches log data in main memory; an encryption service; a compression service; etc.** Distributed services, such as ....

W. De Jonge, M. F. Kaashoek, and W. C. Hsieh. *The Logical Disk: a new approach to improving file systems*. Operating Systems Review, 27(5):15--28, Dec. 1993.

Rodney Van Meter - Information Sciences (Correct)

....much like an extent based file system. **Our** work benefits from this work. **Other** possible file system structures, such as SGI s XFS [12] may depend on more dynamic, and hence complex, data structures, and may therefore not allocate blocks as predictably. **A log based file system [9] or disk device [3] clearly will not, in their present forms, allocate blocks in a fashion amenable to improving throughput by careful choice of blocks.** 6.2 Impact on File System Allocation Policies As proposed by Ghandeharizadeh [4] the idea of including a measure of ZCAV effects into a dynamic file relocater is ....

W. de Jonge, M. F. Kaashoek, and W. C. Hsieh. *The logical disk: A new approach to improving file systems*. In Proc. Fourteenth ACM Symposium on Operating Systems Principles, pages 15--28, Dec. 1993.

Elephant: The File System that Never Forgets - Douglas Santry (1999) (8 citations) (Correct)

.... **a set of new utilities that exploit Elephant s novel functionality (we have already written a few utilities including tgrep , tls , and a history browser) Third, we are examining an alternate implementation that provides versioning at the level of blocks and abstracted by a logical disk [1].** Fourth, we are investigating how to backup an Elephant file system so that version histories can be recovered following a media failure. **Finally**, we are planning an extensive user study. **To** facilitate this study, we are modifying our prototype to allow it to shadow an NFS server. **Users** will thus ....

W. de Jonge, M. Kaashoek, and W. C. Hsieh. *The logical disk: A new approach to improving file systems*. In Proceedings of the 14th Symposium on Operating Systems Princi ples, pages 15--28, December 1993.

Opportunistic Log: Efficient Reads in a Reliable Object Server - O'Toole, Shrira (1994) (1 citation) (Correct)

....on the basis of disk head position, we can expect to dramatically reduce the expected cost of an installation read. **There is substantial previous work on delayed processing of disk write operations [18, 10] Some methods applied to delayed disk writes involve writing pages at new locations [4, 7, 15] and would not work with disk reads.** However, standard disk scheduling methods based on head position apply equally well to read operations. **In** particular, Seltzer et al. 18] have shown that when a pool of 1000 operations is available, greedy algorithms can reduce the cost of individual ....

W. de Jonge, F. Kaashoek, and W. Hsieh. *The logical disk: A new approach to improving file systems.* In Proc. of the 14th Symposium on Operating Systems Principles, Asheville, NC, December 1993. ACM.

Report of the Working Group on Storage I/O for Large-Scale .. - Gibson, Vitter, Wilkes (1996) (3 citations) (Correct)

.... **onto spare disks, and future accesses remapped to the new devices [32] Storage devices are typically burdened by long positioning times, and a virtual device can be used to dynamically remap the physical location associated with a logical block, thus reducing the current access latency [19, 23, 57, 58, 73].** Additionally, most modern disk drives perform dynamic request reordering, in some cases taking advantage of low level information available only inside the storage device to optimize the request sequencing [35, 63] Since there is no single redundant disk array organization that is optimal for ....

de Jonge, W., Kaashoek, M. F., and Hsieh, W. C. *The logical disk: A new approach to improving file systems.* In Proc. of 14th ACM Symp. on Operating Systems Principles (December 1993).

The HP AutoRAID hierarchical storage system - Wilkes, al. (1996) (116 citations) (Correct)

....still further. **Some** of the schemes described in [Menon and Courtney 1993] are also used in the dual controller version of the HP AutoRAID array to handle controller failures. **The Loge disk drive controller [English and Stepanov 1992] and its followons Mime [Chao et al. 1992] and Logical Disk [de Jonge et al. 1993], all used a scheme of keeping an indirection table to fixed sized blocks held on secondary storage.** None of these supported multiple storage levels, and none was targeted at RAID arrays. **Work** on an Extended Function Controller at HP s disk divisions in the 1980s looked at several of these issues, ...

.... **1993; Seltzer et al. 1995] and cleaning (garbage collection) policies for them [Blackwell et al. 1995; McNutt 1994; Mogi and Kitsuregawa 1994] There is a large literature on hierarchical storage systems and the many commercial products in this domain (for example [Chen 1973; Cohen et al. 1989; DEC 1993; Deshpandee and Bunt 1988; Epoch Systems Inc.** 1988; Gelb 1989; Henderson and Poston 1989; Katz et al. 1991; Miller 1991; Misra 1981; Sienknecht et al. 1994; Smith 1981] together with much of the proceedings of the IEEE Symposia on Mass Storage Systems) Most of this work has been concerned with ....

DE JONGE, W., KAASHOEK, M. F., AND HSIEH, W. C. 1993. *The Logical Disk: a new approach to improving file systems.* In Proceedings of 14th ACM Symposium on Operating Systems Principles. ACM, New York, 15--28.

A Comparison of OS Extension Technologies - Small, Seltzer (1996) (53 citations) (Correct)

....another region of the file. **If** the kernel uses heuristics (rather than application knowledge) to choose a read ahead policy, it can not cope with arbitrary application behavior. **With** the cooperation of the application, it can make more appropriate read ahead decisions. **A Logical Disk facility (LD) [DEJON93] sits between the filesystem and the physical disk.** The filesystem reads and writes logical blocks, and the LD maps the logical requests to locations on the physical disk. **The** LD can be used to transparently replicate data, by writing it in multiple places on the same disk or multiple disks, and ....

....to support a log structured layer between a filesystem and the physical disk. **The** simulation accepts write requests for logical blocks and maintains the mapping between these logical blocks and the physical blocks onto which they are stored. **As with the system implemented by de Jonge et al. [DEJON93], our simulation maintains all data structures in main memory.** We simulate a 1GB physical disk with 4KB blocks and 64KB (16 block) segments. **Our** simulation uses a stream of block write requests that are skewed so that 80 of the requests are for 20 of the blocks. **Because** our simulation does not ....

de Jonge, W., Kaashoek, M. F., Hsieh, W., "*The Logical Disk: A New Approach to Improving File Systems,*" Proceedings of the 14th SOSP, pp. 15--28, Asheville, NC (December 1993).

DCD - Disk Caching Disk: A New Approach for Boosting I/O.. - Hu, Yang (1996) (6 citations) (Correct)

....approaches 80 . In addition, LFS needs to buffer a large amount of data for a relatively long period of time in order to write into disk later as a log, which may cause reliability problems. **There are several other approaches such as log structured array [11] Loge [12] and Logical Disk approach [13].** The Logical Disk approach

improves the I O performance by working at the interface between the file system and the disk subsystem. **It** separates file management from disk management by using logical block numbers and block lists. **Logical** Disk hides the details of disk block organization from the ....

W. de Jonge, M. F. Kaashoek, and W. C. Hsieh, "*The logical disk: A new approach to improving file systems*," in Proceedings of the 14th ACM Symposium on Operating Systems Principles, (Asheville, NC), pp. 15--28, Dec. 1993.

The HP AutoRAID hierarchical storage system - Wilkes, al. (1995) (116 citations) (Correct)

....mirrored form, thereby improving performance still further. **Some** of the schemes described in [Menon93] are also used in the dual controller version of the HP AutoRAID array to handle controller failures. **The Loge disk drive controller [English92] and its follow ons Mime [Chao92] and Logical Disk [deJonge93], all used a scheme of keeping an indirection table to fixed sized blocks held on secondary storage.** None of these supported multiple storage levels, and none were targeted at RAID arrays. **Work** on an Extended Function Controller at HP s disk divisions in the 1980s looked at several of these ....

Wiebren de Jonge, M. Frans Kaashoek, and Wilson C. Hsieh. *The Logical Disk: a new approach to improving file systems.* Proceedings of 14th ACM Symposium on Operating Systems Principles (Asheville, NC), pages 15--28, 5--8 December 1993.

Report of the Working Group on Storage I/O for Large-Scale .. - Gibson, Vitter, Wilkes (1996) (3 citations) (Correct)

.... **onto spare disks, and future accesses remapped to the new devices [32] Storage devices are typically burdened by long positioning times, and a virtual device can be used to dynamically remap the physical location associated with a logical block, thus reducing the current access latency [19, 23, 57, 58, 73].** Additionally, most modern disk drives perform dynamic request reordering, in some cases taking advantage of low level information available only inside the storage device to optimize the request sequencing [35, 63] Since there is no single redundant disk array organization that is optimal for ....

de Jonge, W., Kaashoek, M. F., and Hsieh, W. C. *The logical disk: A new approach to improving file systems.* In Proc. of 14th ACM Symp. on Operating Systems Principles (December 1993).

Petal: Distributed Virtual Disks - Lee, Thekkath (1996) (133 citations) (Correct)

....work related to Petal in terms of four primary characteristics: type of abstraction (block level or file systemlevel) degree of distribution, level of fault tolerance, and support for incremental expandability. **Related block level storage systems include RAID II [7] TickerTAIP [5] Logical Disk [8], Loge [10] Mime [6] AutoRAID [19] and Swift [4] Some of these systems support only simple algorithmic mappings between the address space seen by a client and the underlying physical disks.** This mapping is usually completely specified when the system is configured. **In** contrast, AutoRAID, ...

Wiebren de Jonge, M. Frans Kaashoek, and Wilson C. Hsieh. *The logical disk: A new approach to improving file systems.* In Proceedings of the 14th ACM Symposium on Operating Systems Principles, pages 15--28, December 1989.

Opportunistic Log: Efficient Installation Reads in a Reliable .. - O'Toole, Shrira (1994) (11 citations) (Correct)

....on the basis of disk head position, we can expect to dramatically reduce the expected cost of an installation read. **There is substantial previous work on delayed processing of disk write operations [13, 25] Some methods applied to delayed disk writes involve writing pages at new locations [5, 8, 22] and would not work with disk reads.** However, standard disk scheduling methods based on head position apply equally well to read operations. **In** particular, Seltzer et al. 25] have shown that when a pool of 1000 operations is available, greedy algorithms can reduce the cost of individual ....

W. de Jonge, F. Kaashoek, and W. Hsieh. *The Logical Disk: A New Approach to Improving File Systems.* In Proc. of the 14th Symposium on Operating Systems Principles, Asheville, NC, December 1993. ACM.

Exodisk: Maximizing Application Control Over Storage Management - Grimm (1996) (1 citation) **Self-citation (Kaashoek)** (Correct)

....to set their own storage allocation policies and optimizations. **This approach prevents the exodisk system from transparently reorganizing data on disk or avoiding block overwrite semantics, as is done in some logical representations of disk storage (for example, in Mime [7] or the Logical Disk [8]) But it also does not suffer from the overheads associated with such logical to physical mappings, and it gives applications the flexibility to utilize the policies that are best suited for the given application.** Furthermore, if desired, logical representations of disk storage can be implemented ....

....self protected extent, has its own protection information) Alternatively, it can use one exonode, storing the FAT in the exonode as application defined data and using fixed size extent entries for the individual blocks. **Logical representations of disk storage such as Mime [7] or the Logical Disk [8] map logical block numbers to physical disk locations.** Such a mapping can be efficiently implemented using an exonode: The logical block number can be an index into the array of exonode entries and the physical block information (again, a fixed size extent) is stored in that exonode entry. ....

[Article contains additional citation context not shown here]

Wiebren de Jonge, M. Frans Kaashoek, and Wilson C. Hsieh. *The logical disk: A new approach to improving file systems*. In Proceedings of the 14th Symposium on Operating Systems Principles, pages 15--28, Ashville, North Carolina, December 1993.

Design Considerations for the Symphony Integrated.. - Shenoy, Goyal, Rao, Vin (Correct)

No context found.

W. Jonge, M. F. Kaashoek, and W. C. Hsieh. *The Logical Disk: A New Approach to Improving File Systems*. In Proceedings of the Fourteenth Symposium on Operating Systems Principles, 1993.

A Tool for Constructing Safe Extensible C++ Systems - Small (1998) (7 citations) (Correct)

No context found.

de Jonge, W., Kaashoek, M. F., Hsieh, W., "*The Logical Disk: A New Approach to Improving File Systems*," Proc. 14th SOSP, Asheville, NC, 15-- 28, December 1993.

HFS: A flexible file system for shared-memory multiprocessors - Krieger (1994) (17 citations) (Correct)

No context found.

Wiebren de Jonge, M. Frans Kaashoek, and Wilson C. Hsieh. *The logical disk: A new approach to improving file systems*. In Proceedings of the Fourteenth ACM Symposium on Operating Systems Principles, pages 15--28, 1993.

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